



Systemic Risk and Risk Management: Overview and Approach

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ABSTRACT

This paper is a compilation and expansion of two earlier papers, one on systemic risk and the other on strategic risk management. Part 1 of the paper proposes a definition and assessment methodology for systemic financial risk that was inspired by systems accident research. Sociologist Charles Perrow found that industrial, aviation and marine systems are prone to failure if those systems are interactively complex and tightly coupled. Using that framework as a starting point, financial crisis research led to the definition of systemic financial risk as a function of financial complexity and excessive leverage. The paper presents practical criteria for applying these parameters, and then profiles the triggering mechanism of systemic financial risk—financial contagion—in a behavioral context consistent with my framework. Part 2 of the paper presents an approach for identifying the weak signals of developing ambiguous threats, such as systemic financial risk manifestation, as well as an approach for economically managing the risk of enterprise-threatening loss. Both parts of the paper are readily assessable to a broad array of financial agents and researchers.

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1. Introduction: Systemic Risk

The popular definition of *systemic financial risk* is “risk that cannot be diversified” (Brealey and Meyers, 2000 [1981], p. 1,068). Notwithstanding its popularity, this definition has little—if any—practical value, especially since the phenomenon of systemic financial risk has become much more tangible following the 1997-1998 and 2007-2008 financial crises. In fact, since 2008, a question that is frequently asked is “Can the global financial system come tumbling down?”

Interestingly, such a question was addressed some time ago by the late George Goodman a/k/a “Adam Smith” in his classic book, *The Money Game*, as follows: “Can it all come tumbling down? In a paper market, based on belief, this fear is universal, no matter how deep it is buried. Sure, it can all come tumbling down. All it takes if for belief to go away” (Goodman, 1968 [1967], p. 288).

I agree with Mr. Goodman, which begs the question: how can one tell if the “risk of non-belief” is increasing and, potentially, if the risk of another financial crisis is manifesting? To answer this question I looked to systems-oriented research, which led me to define systemic financial risk as the possibility of an economy-wide crash caused by losses generated from complex financial interactions fueled by excessive leverage. This definition was inspired by Perrow (1999 [1984]) and his seminal systems accident framework, which defines an accident-prone system as one that is both interactively complex and tightly coupled. This framework was derived from detailed analyses of industrial, aviation and marine accidents by way of case studies. Leveraging this approach, I analyzed financial crisis case histories to derive a framework to assess systemic financial risk,¹ which is presented in the first two sections below. The triggering mechanism of systemic financial risk—financial contagion—is then profiled from a behavioral perspective, and the framework is then applied to an overview of the modern financial system leading to a discussion of practical risk management techniques.

Financial Complexity

The first parameter of systemic financial risk is financial complexity.² In general, a system is *complex* “when there are strong interactions among its elements, so that current events heavily influence the probabilities of many kinds of later events” (Axelrod and Cohen, 2000, p. 7). Extending this basic definition, *financial complexity* can be practically defined as unfamiliar, unexpected, and/or not immediately comprehensible financial interactions that could be systemically significant.³ According to Professors Amos Tversky and Daniel Kahneman,

"Even when the likelihood of failure in each component [of a system] is slight, the probability of an overall failure can be high if many components are involved."⁴ As defined here, financial complexity is a function of the components or criteria outlined in Table 1.

Table 1

Common Characteristics of Financial Complexity*

▪ Significant financial concentration
▪ Financial concentrations are subject to strict transactional requirements
▪ Financial products and/or counterparties have the potential to interact
▪ Interactions subject to unfamiliar or unexpected feedback loops
▪ Limited ability to isolate the volatility of at-risk financial counterparties, sectors, regions, and/or products
▪ Limited understanding of financial products and/or concentrations
▪ Normalized strategic deviations [†]

Notes:

* Inspired by Perrow (1999 [1984]), p. 88. This source is a classic risk management text.

[†] Inspired by Vaughan (1997 [1996]). See McLean and Nocera (2010) for an example of how the normalization of strategic deviations relate to complexity, and how complexity relates to systemic financial risk (pp. 240-242). As Grant (2014a) observed, "When complexity seems a pesky problem in a bull market, you can bet your bottom euro [dollar, etc.] it will prove a daunting one in a bear market" (p. 9).

The first criterion in the exhibit is a **significant financial concentration** or a large financial obligation to/or from specific counterparties, sectors, regions, and/or large financial product exposures. Financial agents have long been aware of concentration risk, for example:

- One financial executive observed that, "If you have got sixty, one hundred billion, or however many billions of something on your balance sheet, which is a *very* big number... I don't think you should ignore a big number, no matter what it is" (*italics original*).⁵
- "History is littered with examples of banks that collapsed because they misjudged default risk [i.e., counterparty creditworthiness] or had too much exposure to a single sector or lender. The savings and loan debacle of the late 1980s and early 1990s was one case in point" (Tett, 2010 [2009], p. 44).⁶
- Before its epic 1998 failure, Long-Term Capital Management (LTCM) had a \$1 trillion notional derivatives exposure (Lowenstein, 2000, p. 200).
- More than half of Fannie Mae's and Freddie Mac's delinquencies during the 2007-2008 financial crisis occurred in just four states: California, Arizona, Nevada, and Florida (Acharya, et al., 2011, p. 89).

Derivatives-based concentrations generally continued to grow following LTCM's historic failure; for example, consider the growth of credit default swaps (CDS) profiled in Figure 1. What makes this exhibit material from a systemic risk perspective is not just its "big numbers" but also the interconnected counterparty structure that was (is) exposed to it. Significantly, this structure is the result of *both* governmental and non-governmental financial actions because government has facilitated the sale of troubled financial institutions to more fiscally sound ones. The short-term objective of this policy, and its related easy-money policies (which are discussed below), was to rescue troubled institutions without directly involving taxpayer funds, which seems to have been accomplished. However, one long-term consequence of the policy has been steadily increased levels of financial concentrations risk.⁷

The second criterion follows the first in that **financial concentrations are subject to strict transactional requirements**. The quintessential example of a strict financial transactional requirement is "on demand" deposit withdrawals in a fractional reserve banking system. Taken to extremes such withdrawals can result in a run, which could become systemically significant. For example, during the Great Depression, "The number of commercial bank failures increased from 1,453 in 1932 to 4,000 in 1933 (most of which took place in the first quarter), with deposits of failed banks increasing from \$706 million to \$3.6 billion in the same period" (Rothbard, 2000 [1963], p. 325). Bank runs have since generally become a thing of the past due to the creation of deposit insurance.⁸ However, run-like behavior still occurs; for example, consider the repo market during the 2007-2008 financial crisis (McLean and Nocera, 2010, p. 242). Furthermore, the failure of AIG is attributed, at least in part, to a collateral run based on requirements outlined in credit support annexes to derivatives contracts the firm sold.⁹ Significantly, those contracts were so complicated they were allegedly not well understood by AIG's executives prior to the financial crisis that caused it to fail (e.g., Boyd, 2011). We return to the issue of limited understanding in complex finance shortly.

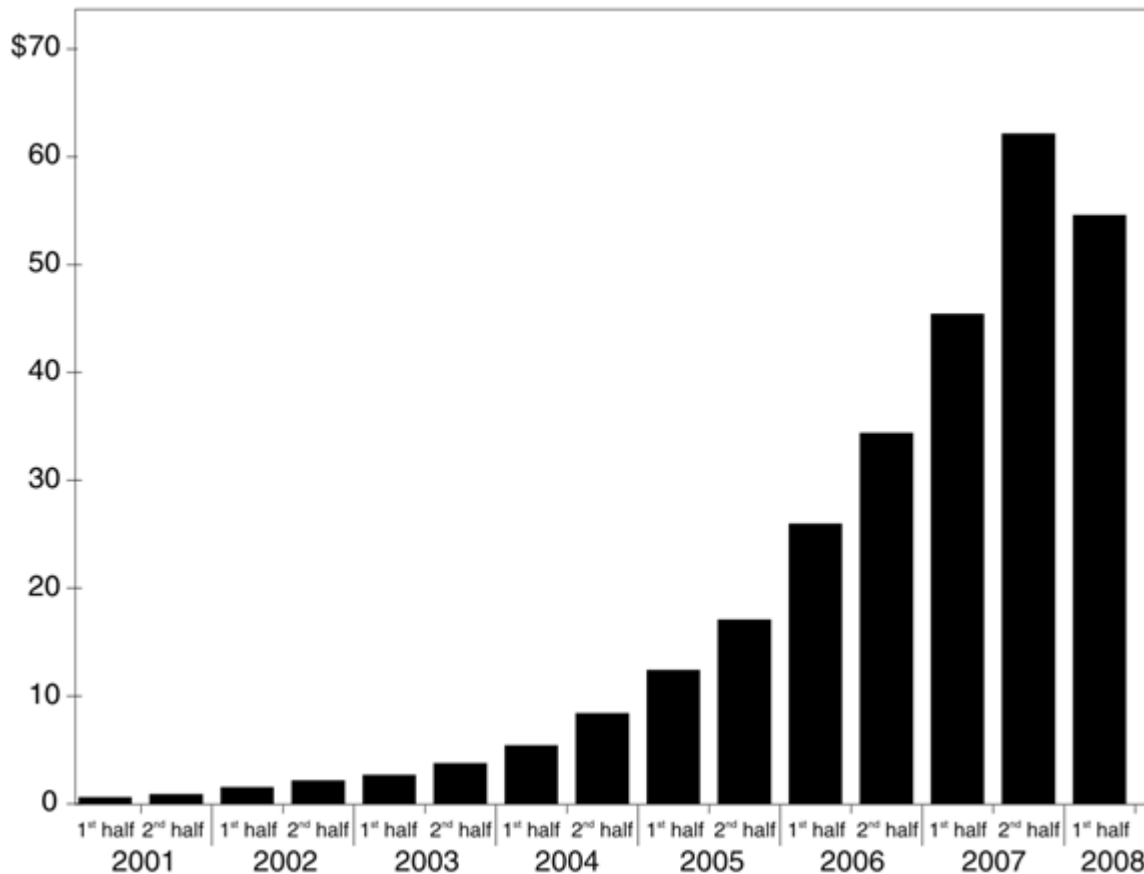


Figure 1
Credit Default Swap Growth: 2001-to-2008 (\$Trillions)

Source: <http://www.elliottwave.com/freeupdates/archives/2008/10/03/Struggling-To-Stay-Alive--in-the-Credit-Default-Swamp.aspx>

The next criterion is that **financial products and/or counterparties have the potential to interact**. In his study of LTCM's 1998 failure, Lowenstein (2000) noted that the fund was trading in swaps and bonds in Great Britain, Denmark, New Zealand, Hong Kong, Sweden, Switzerland, Germany, France, Belgium, Italy, Spain, the Netherlands, Brazil, Argentina, Mexico, Venezuela, Korea, Poland, China, Taiwan, Thailand, Malaysia, the Philippines, and Russia (p. 188). Clearly, their portfolio had significant potential to interact,^{10,11} as did AIG's ten years later as Boyd (2011) observed:

"Given that almost a dozen insurance subs were compromised, millions of policyholders were in danger of literally being at risk with no economic backing to support their claims. *Internationally, there would be immediate slowdown to shipping and aviation*, as AIG was a key player in insuring both market segments.... What cash or liquid assets there was at AIG would have been sent, eventually, to the insurance subsidiaries to meet those obligations. Left

remaining would have been a \$1.2 trillion balance sheet that would have dwarfed the collapse from the looming Lehman bankruptcy” (p. 281; italics added).

According to the same author, “the wide-ranging connections from AIG to the entire global financial apparatus wasn’t either understood or appreciated” (Boyd, 2011, p. 280).¹² Insightful work by Chan-Lau (2010) demonstrates the applicability of interconnectedness-based analysis; however, from a financial system’s perspective such analysis should be accompanied by an appreciation for **interactions subject to unfamiliar or unexpected feedback loops** such as, for instance, AIG’s potential impact on shipping and aviation noted above.¹³ For a more detailed example, consider financial market activity during the 1997-1998 financial contagion as described by Lowenstein (2000):

- As bond prices started to decline LTCM was forced to sell some of its holdings, which caused market volatility to rise. At the time, LTCM thought this market behavior “was simply nonsensical [i.e., very unexpected]; it felt as though volatility was rising only because traders knew that Long-Term was vulnerable [i.e., feedback]—which at that point was probably true” (p. 191).
- Continued selling resulted in a “crisis of fear” that “became a self-fulfilling prophecy... As [bond] prices fell, banks backed away from hedge funds [like LTCM]. And as banks backed away, hedge funds had to keep selling” (p. 152).
- The intensity of the selling resulted in traders taking steps “to protect themselves against Long-Term’s imminent collapse,” which ultimately resulted in a drastic step: “traders went on strike and ‘liquidity’ disappeared” (p. 229).^{14,15}

As another example, Tett (2010 [2009]) stated that the “essential problem” during the financial crisis of 2007-2008, “was that the system was becoming trapped in a vicious spiral. The more banks revealed losses on super-senior assets—or any other credit assets—the more scared investors became, causing the prices of the assets to fall still further, which forced the banks to make more write-downs. It was a pernicious feedback loop” (p. 210).^{16,17}

Unfamiliar or unexpected financial interactions can also involve governmental financial agents. For example, the structured finance products at the center of the 2007-2008 financial crisis were initially created to mitigate the effects of regulatory banking capital requirements (Tett, 2010 [2009], pp. 45-50, 56, 97-98),¹⁸ as well as to take advantage of tax credits (Boyd, 2011, p. 80).¹⁹ These products therefore helped to facilitate compliance with the government's easy-lending mortgage policy that began in the early 1990s (Redleaf and Vigilante, 2010, Ch. 10).²⁰

An implicit “too-big-to-fail government guarantee” further facilitated compliance with that policy for “large complex financial institutions” (Acharya, et al., 2011, pp. 48-49).²¹ However, perhaps the most significant example of governmentally-triggered feedback over the past generation has resulted from its consistent easy-money policy during periods of financial volatility, which Morris (2008) describes as follows:

“The term ‘Greenspan Put’ became commonplace around Wall Street in the early 2000s.... These excerpts from an influential investment newsletter from August 2007 perfectly capture the import of the Greenspan Put:

“I remember well the stock market crash of October 1987.... There were widespread fears that the big banks might be in trouble and that a credit crunch would follow.... In response, *the Fed cut interest rates three times in six weeks*. The U.S. economy continued to grow... stocks recovered to new highs...”²²

“The 1998 stock market plunge saw the S&P 500 dive.... [O]f Course we were headed for a serious recession. In response, *the Fed cut rates three times in seven weeks*.... In 1999 and 2000, the U.S. and global economies recorded their strongest growth in a decade....

“The 2001 recession, worsened by the 9/11 attacks, sparked many of the concerns we are hearing today about a credit crunch. As a result, *the Fed cut rates three times in seven weeks*. There was no serious credit crunch.

“That is the Greenspan Put: No matter what goes wrong, the Fed will rescue you by creating enough cheap money to buy you out of your troubles” (pp. 64-65; italics original).^{23, 24}

The above is significant because the “free market” is frequently identified as the culprit of many financial crises, including the most recent one.^{25, 26} From a systemic perspective, this is not accurate because the United States’ financial system is and has been a “mixed economy” inasmuch as government actively participates in financial matters/transactions via regulation,²⁷ the related phenomenon of “regulatory capture” (Dunbar, 2011, Ch. 5, which is titled “Regulatory Capture.”),^{28, 29} fiscal policy³⁰ (including tax policy³¹), monetary policy,³² and governmental sponsored entities (GSEs).³³ Therefore, governmental participation *must* be included in any systems-based analysis even though,³⁴ as Greider (1987) insightfully observed, “No one wished to admit that the free market was already, in fact, contaminated by government manipulation” (p. 139).^{35, 36}

The next criterion is a **limited ability to isolate the volatility of at-risk financial counterparties, sectors, regions, and/or products**. Volatility isolation is arguably a reason

why the savings and loan crisis of the 1980s did not spillover into the broader financial system. Despite the losses it generated, estimated by some authors at \$153 billion (Curry and Shibut, 2000, p. 33), volatility from that crisis was generally confined to thrifts; in contrast, neither the LTCM failure in 1998 nor the failure of AIG ten years later were easily isolated from either a product (derivatives) or counterparty perspective. To help understand why, consider that according to Lowenstein (2010) one financial institution had 120,000 trades open with AIG at the time AIG failed (p. 184). The limited ability to isolate volatility increases spillover risk, which is accentuated when key financial agents—governmental and non-governmental alike—have limited-to-no understanding of the drivers of that volatility. One likely cause of this is the structure of many financially innovative products, e.g., Dunbar (2011) profiled a CDO-cubed created in 2007 that has been likened to the “eyes of Satan.” Figure 2 illustrates and explains why.

Limited understanding of financial products and/or exposures can result in significant losses such as those experienced during both the 1997-1998 and 2007-2008 financial crises.³⁷ Each crisis brought to light staggering derivatives-based knowledge gaps that many blame, at least partially, on the quantitative models used to make derivatives-based decisions.³⁸ However, from a system’s perspective, such critiques should be broadened:

- From a methodological perspective it is, and has been, accepted practice to rely on modeled output derived from unrealistic assumptions so long as the output “yields sufficiently accurate predictions” (Friedman, 1966, pp. 3-16, 30-43).³⁹ There are obvious issues with this approach; for example, how is “accurate” defined, and over what time frame: “normal” times or more volatile ones, and if the later, how is “volatile” defined, etc. From a financial perspective, such thinking over time facilitated the widespread belief in a body of theory developed off of a base of knowingly false assumptions,^{40, 41} which nevertheless significantly influenced financial agent—governmental and non-governmental—actions.
- The increasingly intense focus on financial modeling led to a steady decline in other forms of analyses, at all levels. For example, during the 2007-2008 crisis, Tully (2008) profiled J.P. Morgan Chase CEO Jamie Dimon’s detail-focus and intimated that it, and the culture it produced, was one of the reasons why J.P. Morgan Chase weathered the crises relatively well.⁴² If his intimation is correct, it begs the question why other financial executives were not similarly focused given the complexity of their firms’ risk profiles; and yet, according to Lewis (2010), prior to the crisis some financial executives did not even “know their own balance sheets” (p. 174).⁴³

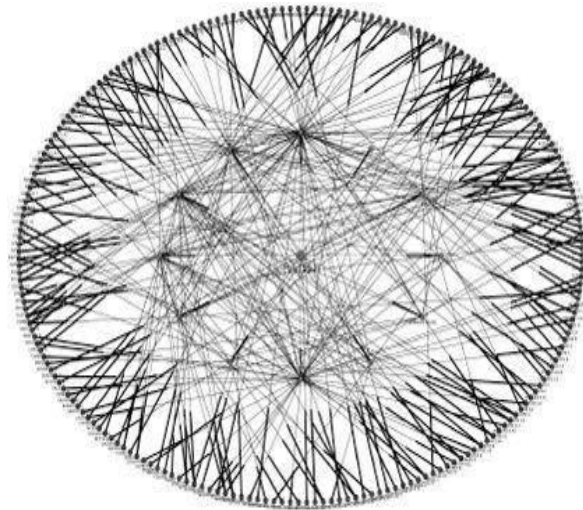


Figure 2
The “Eyes of Satan”

Source: <http://successmill.com/the-devil-s-derivatives/the-eyes-of-satan/951-the-eyes-of-satan-2.html>

Dunbar (2011) explains this illustration as follows: “The node at the center of the graph represents the CDO itself, whose investments in other CDOs are represented by the inner ring of nodes, which in turn invest in each other, and additional CDOs represented by the outermost ring of nodes. These CDOs also used default swaps to invest in hundreds of mortgage bonds, which have been left out of the diagram for reasons of simplicity. To fully document a transaction like this would require a prospectus hundreds of millions of pages long” (p. 200).

This phenomenon applies to governmental agents as well as non-governmental ones. For example, during the 2007-2008 financial crisis members of the Federal Reserve System were struggling, along with financial professionals, to understand exactly what was happening with all of the various “financial innovations” such as collateralized debt obligations (CDOs). Figure 3 humorously illustrates this struggle by noted financial cartoonist Hank Blaustein, which is reproduced with permission.



Figure 3
Understanding “Financial Innovation”

Courtesy of James Grant.

One consequence of the above over the past generation was that many, but certainly not all, financial agents either missed signals of approaching financial volatility or followed conventional wisdom on efficient markets and the governmental intervention seemingly intended to facilitate efficiency (e.g., the Greenspan/Bernanke Put).^{44, 45} Another consequence was that as financial modeling came to be more relied upon, it became a specialized field even though quantitative models are relatively easy to copy.⁴⁶ Therefore, when model-based strategies started generating abnormal returns they attracted both investors and competitors which, along with the returns, caused portfolio sizes to increase.⁴⁷ This phenomenon limited investment alternatives thereby creating a temptation to **normalize strategic deviations**, or to incrementally expand an investment and/or business strategy over time resulting in the assumption of greater levels of risk than originally would have been tolerated.⁴⁸

As quantitatively-generated investment opportunities became increasingly limited due to increasing portfolio sizes and competition, many financial institutions began to incrementally expand their investment and/or business strategies in search of other opportunities. Over time, this expansion led to broader, more expansive risk profiles that were nevertheless viewed as “normal”—or consistent with a stated risk appetite—even though they were not. Because this expansion occurred incrementally it did not appear deviant; on the contrary, financial agents often believed their behavior conformed to their institutions’ investment and/or strategic principles. One possible reason for this is that it is relatively easy to rationalize incremental

deviations for yield, diversification or assumed informational advantage reasons that, when assessed in isolation, seem strategically consistent.⁴⁹ Consider the following examples:

- LTCM was formed to “trade spreads between pairs of bonds to either widen or contract” on a highly leveraged basis (Lowenstein, 2000, p. 26; italics original). However, “As the pressure to find suitable trades mounted, they increasingly strayed into more exotic tundra,... [including] directional bets, abandoning (for a fraction of its portfolio [i.e., incrementally]) the cautious hedging strategy that had been its trademark” (Lowenstein, 2000, pp. 127-128).

- AIG Financial Products (FP) normalized strategic deviations over time prior to its failure as Boyd (2007) explained:

“When FP was considering its first deal, an interest rate swap of \$1 billion on Italian government debt slated to launch in July 1987, [its former president, Howard] Sosin spent weeks studying and analyzing a litany of risks....

“In contrast, to write swaps on hundreds of billions of dollars of debt in 2005, FP plugged down a handful of variables into a seven-year-old computer model. Somehow, their model always said ‘yes.’

“To Howard Sosin and [his successor] Tom Savage, the only reason FP existed was to get *away* from this type of business. They both looked at these trades as a total waste of time and resources in a marketplace that was crowded with well-educated sheep...

“Joe Cassano [Savage’s successor] saw it differently, though. If you could pick up 10 basis points and the downside was triggered only by a Crash of 1929 proportions, he liked the odds. If he was right, he had a multimillion-dollar portfolio of cash annuities. If he was wrong...” (pp. 183-184; italics original).

- Normalizing strategic deviations also applies to governmental financial agents; for example, Acharya, et al. (2011) observed that Fannie Mae and Freddie Mac began to deviate strategically in 1992 due to the Federal Housing Enterprises Financial Safety and Soundness Act, which gave these “GSEs a mandate to purchase lower-quality mortgages” (p. 32). This deviation was the first of many GSE strategic deviations that resulted in these entities being “grown far beyond their initial purpose into uncontrollable and systemically risky behemoths” (Acharya, et al., 2011, p. 6).⁵⁰

The risks of normalizing strategic deviations can be difficult to identify, assess and quantify as emerging risks are developing; however, once such risks manifest the cumulative effects are

often seen to have resulted in outsized losses being brought within the main body of a loss distribution. In other words, the process of normalizing strategic deviations can result in much higher frequencies of extreme events over time. Morgenson and Rosner (2011) recognized this in their study of Fannie Mae when they observed that “the company’s past experience with losses was almost certainly not going to be repeated going forward, given the new low-income housing requirements mandated by Congress. Fannie was embracing a new world of riskier loans...” (p. 28).⁵¹

Excessive Leverage

As noted above, Perrow’s (1999 1984) systems accident framework is based on two parameters: complexity and *tight coupling*, which is “a mechanical term meaning there is no slack or buffer or give between two items. What happens in one directly affects what happens in the other” (pp. 89-90). Perrow also applied his framework to financial risk and in so doing used volume as a financial proxy for tight coupling. However, increased volume adds depth and breadth to a market and thus is analogous to loose coupling, not tight.⁵² According to Acharya, et al. (2011), a more appropriate financial analog to tight coupling is excessive leverage because, “Systemic risk emerges when a financial sector at large does not have enough capital to cover either its debts or its bets. As a result, when those bets go sour and debts cannot be paid, many institutions fail or the credit markets freeze—and without credit, commerce plummets, and economies fall into recession” (pp. 63-64).⁵³ Furthermore, Richard Bookstaber observed that, “Tight coupling is accentuated by leverage, itself a direct result of liquidity. Leverage and margin are simply loans that use securities as collateral, and the willingness to lend against this collateral is directly related to the lender’s ability to quickly sell out of the securities if the margin is not posted. The more liquid the securities, the better the leverage terms will be. So tight coupling means higher potential leverage.” (Grant, 2008, p. 347). For example, during the 2007-2008 financial crisis one observer described the market environment “as something akin to a horror movie, in which an insatiable monster marauds across Wall Street, attacking leverage wherever it could find it” (Farrell, 2010, p. 231).⁵⁴

From a financial agent perspective, excessive leverage has long equated to increased levels of risk and thus capital structure is *not*, and *never* has been, “irrelevant.” Quite the contrary, in fact; for example, one author views capital structure as a “volatility machine” that should be actively managed (Pettis, 2001). To understand why, consider former Fed Chairman Ben Bernanke’s past—and highly accurate—observation that, “Using high leverage to improve corporate performance is much like encouraging safe driving by putting a dagger, pointed at

the driver's chest, in every car's steering wheel; it may improve driving but may lead to disaster during a snowstorm."⁵⁵ Contemporary examples include:

- AIG's failure, which according to Boyd (2011) "started with leverage" (p. 230).
- Much the same can be said for the failure of Lehman Brothers: "*The debt. The debt*" is how McDonald and Robinson (2009) phrased it (p. 310; italics original).
- "Fannie-Freddie fell off the cliff, both because of lower profitability (ROA) and higher leverage. Leverage and risks—essential features that had helped them accelerate and pump up greater shareholder returns (ROE) in good times—accelerated their decline when the housing markets hit the wall" (Acharya, et al., 2011, p. 55).⁵⁶

From a systemic financial risk perspective, *excessive leverage* can be defined as an economy-wide debt load that significantly reduces financial capacity thereby increasing the risk of failure due to manifesting financial complexity risk. Historical examples include:

- Banks over-leveraged from a fractional reserve perspective suffered significant distress during the Great Depression, as well as earlier financial crises.⁵⁷
- Before its 1998 failure, LTCM's debt-to-equity ratio, excluding derivatives, swelled to "greater than 100-to-1" (Lowenstein, 2000, p. 191).⁵⁸
- During the 2007-2008 financial crisis: (1) Lehman Brothers' leverage was estimated at 44-to-1 (McDonald and Robinson, 2009, pp. 287-288), (2) AIG's \$2.5 trillion in derivative exposures dwarfed even its balance sheet at the time (Boyd, 2011, p. 280.),⁵⁹ but (3) "AIG's CDS positions were peanuts in comparison to the GSEs' writing \$3.5 trillion worth of credit guarantees on much riskier assets—residential mortgages—and similarly with little capital [i.e., excessively leveraged] (albeit in accordance with regulatory requirements) and all in one direction" (Acharya, et al., 2011, p. 67.).^{60, 61}

In a "mixed" financial system (or a system that is neither 100% capitalistic nor 100% socialist), excessive leverage applies to governmental, as well as non-governmental, financial agents; therefore, the same kind of approach can be used to assess national debt. For example, the United States' debt-to-gross domestic product (GDP) profile can be illustrated as shown in Figure 4.

The merits of national debt in the United States have been debated since its founding, but even those strongly in favor of it agree there is a "tipping point" beyond which it should not go. For example, according to Wright (2008), even Alexander "Hamilton conceded that there existed

a tipping point beyond which additions to the national debt would be economically and politically deleterious. ‘Where this critical point is cannot be pronounced; but it is impossible to believe,’ he assured, ‘that there is not such a point’” (pp.141-142). Reinhart and Rogoff (2011) suggest that a ratio of 90% gross public leverage-to-GDP (the bottom line in Figure 4) has proven to be an “important marker” of this tipping point over time (represented in the exhibit by a thick-horizontal line).⁶²

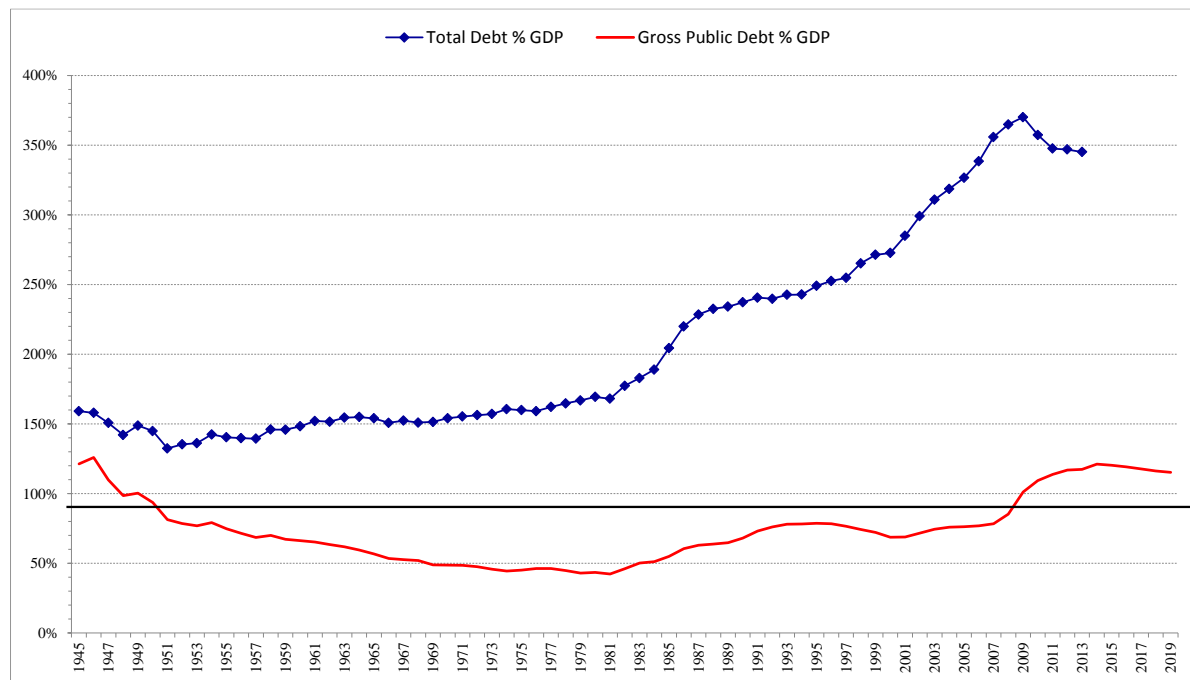


Figure 4

U.S. Gross Public Debt as a Percent of GDP: 1945-to-2019e

Data sources: http://www.usgovernmentspending.com/federal_debt_chart.html (years 2012-to-2019 for Gross Public Debt % GDP are estimates provided by the data source), and

http://ycharts.com/indicators/us_total_debt_gdp Despite its popularity, GDP is an incredibly limited measure.

For more information see, for example, Coyle (2014).

Gross public leverage, however, is not a comprehensive measure: adding governmental debt to non-governmental debt and then comparing to GDP provides a more comprehensive view of national debt (the upper, diamond-line in Figure 4). However, not even this measure is comprehensive because it excludes unfunded liabilities, which are significant as Fisher (2008), who is the former President of the Dallas Federal Reserve, and David M. Walker, former Comptroller General of the United States, have observed (Wright, 2008, p. 281).⁶³ It also does not include derivatives, which are systemically significant leveraged instruments as the crises of 1997-1998 and 2007-2008 demonstrated.^{64,65}

The fact that "excessive leverage" appears so hard to measure underscores the need to systemically address it.⁶⁶ Excessive amounts of leverage result in limited-to-no capacity to respond to financial crises. According to Lowenstein (2000), financial crises present a "timeless irony: when you need money most, the most likely sources of it are likely to be hurting as well" (p. 156). It is for this reason that Warburton (2005 [1999]) stated in his incredibly prescient work that, "The best protection against adversity is to have minimal debt and ample liquidity" (p. 252). In essence, liquidity is slack (like loose coupling), which can be used to mitigate the effects of a financial crisis in systemically beneficial ways. For example, consider Warren Buffett's well timed distressed investments in Goldman Sachs and General Electric during the 2007-2008 financial crisis and the information those investments relayed to the financial system, and then consider what may have happened systemically if, instead of buying, Mr. Buffett was forced to sell like so many others were.

Financial Contagion

Financial contagion can broadly be defined as the spillover of volatility from one financial counterparty, sector, region, and/or product to another, and is the manifestation trigger of systemic financial risk.⁶⁷ The specific cause(s) of financial contagion can vary from case-to-case, but irrespective of the cause(s) its severity is a function of volatility that traverses the veins of complexity fueled by the manifesting effects of excessive leverage. The velocity with which this occurs can be significant and may result in behavior that seems "irrational," or at least fearful, to some. Consider, for example, Lowenstein's (2010) diagnosis of the 2007-2008 financial crisis: "The problem was not just with particular institutions; the entire system was shot through with overvalued, and impossible-to-value [i.e., financially complex], loans, leveraged to an intolerable degree. Lacking confidence, the market resembled a vacuum that drew it into every fearful impulse. The fear migrated from one vulnerable institution to the next" (p. 241).

Market behavior like this has been described as "animal spirits... [or] a spontaneous urge to action rather than inaction" (Keynes, 1964 [1953], p. 161).⁶⁸ For example, consider LTCM's aforementioned thoughts as it was experiencing the unfamiliar/unexpected feedback loops that contributed to its failure: the market behavior "was simply nonsensical." Such statements pejoratively dismiss a central facet of contagious financial behavior; namely, that during periods of systemic volatility, financial agents can be expected to act aggressively to protect their capital. As Goodhart (1969) observed, "Fear seems to be a remarkably contagious

emotion” (p. 131).⁶⁹ Acharya, et al. (2011) offer a contemporary and compelling example of this via the 2007 run on the United Kingdom’s Northern Rock:

“To regulators at the time, [their] financial support was intended to calm markets, and their view was that Northern Rock customers were panicking.⁷⁰ But the truth is that, with any uncertainty about bank solvency or timely administration of the government support, it is rational for customers to ‘panic’ first, withdraw their funds, and place them elsewhere. Of course, everyone thinks that way, and a run starts. In an article describing the run on Northern Rock in *The Sunday Times*, this point is perhaps best illustrated by one particular savings customer lining up outside a branch: ‘I don’t want to be the mug left without my savings’” (p. 75; italics original).⁷¹

The same kind of behavior was experienced in 1997-1998 as MacKenzie (2006) observed: “The configuration of the markets by August 1998,... was that the widening of spreads was self-feeding rather than self-limiting. As arbitrageurs began to incur losses, they almost all seem to have reacted by seeking to reduce their positions and in so doing they intensified the price pressure that that had caused them to make the reductions” (p. 231).⁷²

The above is not meant to imply that all actions undertaken by financial agents, either during a financial contagion or in less volatile times, are rational; only that many of them are when considered in context.⁷³ Research designed to gain a greater systemic understanding of financial behavior could help facilitate efforts to mitigate certain forms of market risk over time. For example, according to Kahneman (2011): “One of the lessons of the financial crisis that led to the Great Recession is that there are periods in which competition, among experts and among organizations, creates powerful forces that favor collective blindness to risk and uncertainty” (p. 262). A greater understanding of these forces—including, for example, the effects of anchoring—coupled with other forms of analyses—qualitative and quantitative—could facilitate efforts to mitigate contagious effects.

Post Crisis

Following the 2007-2008 financial crisis, government officials in many countries sought to enact new regulations to prevent another crisis, and they made public statements to that effect. For example, upon being named to an interim United Kingdom Financial Policy Committee, a former official of the Federal Reserve System stated that: “Step number one is to make [banks] less likely to fail: much higher capital.... I would include a so-called SIFI [Systemically Important Financial Institution] surcharge in that, on top of the Basel II capital requirements

and I hope that it is a substantial surcharge, on the order of the 3 percent people are talking about” (Lynch 2011).

Clearly, the consequences statements like the above could generate over time have not been thoroughly analyzed. Such an analysis could begin, for example, by considering the type of financial system that is being targeted; meaning, the desired mix of private and public financial market activity should be *explicitly* outlined and subjected to debate. Next, a thorough inventory of *all* financial regulations and other forms of government financial activity (fiscal policy, monetary policy, GSEs, etc.) could be undertaken and analyzed, especially with regard to interactive effects, intended *and* unintended. This will be a significant endeavor; for example, commenting on just credit rating-related regulation, Frank Partnoy observed that, "The resulting web of regulation is so thick that a thorough review would occupy hundreds, perhaps thousands of pages" (McLean and Nocera, 2010, p. 113). Nevertheless, a comprehensive inventory and review of all governmental financial activity is necessary if the objective is to obtain a comprehensive understanding of the risks posed by the current financial system.⁷⁴ Once such an understanding is achieved, redesign recommendations could begin to be identified and debated.⁷⁵

One of the key areas that should be carefully examined in this effort is what the role of deposit insurance should be. Most people instinctively believe that 100% deposit insurance is inherently good, but in a comprehensive self-examination such beliefs should be carefully scrutinized. For example, deposit insurance reduced the importance of bank risk management and intensified (or drove) the hunt for yield. The consequences of this have been significant since interest rate volatility increased in the 1970-80s. Consider the following:

- In 1986, Henry Kaufman, then Chief Economist of Salomon Brothers, observed that “Savers... are not interested in the risk-taking engaged in by financial institutions to whom they have entrusted their savings, as long as the U.S. Government guarantees the safety of those funds” (Kaufman, 1986, pp. 34-35).
- Fast forward to 1993, and note Day’s (1993) observation that during the 1970-80s, “Brokerage firms searched for the highest rate, pulling money in and out of institutions with even a quarter of a percentage point change. [William] Isaac [Chairman of the FDIC] worried that the firms pulled these vast sums of brokered money in and out of banks and thrifts without regard to the soundness of the recipient institutions, and why not? The money is federally insured” (p. 154).

This behavior did not change following the S&L crisis, of course, as monetary policy became increasingly easier thereby reducing the rates of interest offered on insured savings accounts to increasingly low levels thereby adversely impacting low, middle and upper-middle income families which, of course, is most of the U.S. As a result, a shadow banking system has arisen via money market funds, etc., which operate with *implicit* government guarantees to (somewhat) higher yielding instruments. The relationship between established banks and shadow banks is at best murky, and as such if the 1930s convention of deposit insurance is going to be continued—and politically I do not see how it will not be—consideration should be given to allow people to choose how they would like their savings insured.⁷⁶ For example:

- Depositors who want 100% “on demand” savings could pay a warehouse fee for those savings, which is akin to the fee for a “safe deposit box.”
- Next, different rates of interest could be offered based on different levels of insured deposits. In effect, depositors could insure their savings based on their forecasted cash needs; near-term needs will likely fall in the 100% insured category while later-term needs would be proportionally insured.
- To facilitate deposit insurance selection across a portfolio of savings, banks could provide financial advice. Of course, they would be liable if advice proves either foolish or fraudulent. In this environment, there would be *no* implicit guarantees so everyone (individual savers, their advisers and their banks) would be at-risk of loss, and therefore a premium would once again be applied to sound risk management practices.

Proposal like the above would eliminate much of the “shadow” that currently exists in banking. And with money to be made in core banking again, many banks would no doubt concentrate on banking—and managing their balance sheets—to earn their return, which is what many say they want them to do.

While analyses such as the above are proceeding, the debt burden could be aggressively reduced and restructured to more closely correlate with revenue patterns in order to mitigate the effects of the next crisis—and there is *always* a next crisis.⁷⁷ The importance of reducing excessive leverage is a clear lesson from the 2007-2008 crisis. As Barth (2009) observed:

“From Main Street to Wall Street, one common thread runs through all facets of this story: leverage. Homeowners and major financial firms alike had taken on too much risk and too much debt in their quest for gains. Whenever leverage is excessive, or too many assets are supported with too little owner-contributed capital, a decline in value of the assets can leave

the owner of those assets without the capital to cover losses. In short, an excessively leveraged nation is nothing more than a bubble nation” (p. 5).⁷⁸

Eliminating excessive leverage will increase financial capacity (or slack), which is important because, according to Wright (2008), “Even if current projections hold true, a crisis looms. When it will occur and how it will manifest remain unclear but something is going to have to give at some point” (p. 281). The Economist (2011) put this risk in historical context:

“In a sense, the bill has come due for the past 25 years. A policy of avoiding small recessions [e.g., the Greenspan/Bernanke Put] has resulted in the biggest downturn since the 1930s. Public finances turned out to be weaker than politicians thought. As a result, they have used up all their ammunition [i.e., financial capacity] tackling the current crisis. Governments in the rich world will have very few options left if the economy weakens again.”⁷⁹

The above is easier said than done. For example, many people believe that Ronald Reagan was an effective conservative president and yet as Stockman (1986)—Reagan’s first OMB Director—has shown, even Reagan was overcome by Washington-generated spending,^{80, 81} which has grown incredibly large under Presidents Bush (43) and Obama.

Perrow observed that interactively complex and tightly coupled systems will eventually fail because failure is the logical consequence of such systems. Given the high degree of complexity and leverage in the financial system right now it too could fail, unless the risks of failure are mitigated via significant de-leveraging in the short-term and the rational reduction of financial complexity over time.

In closing this section of the paper, I note that while commenting on Perrow’s work, Lo (1997) stated that, “The challenge is to quantify the notions of interactive complexity and tight coupling so that intelligent trade-offs between risk and reward can be properly made, in both financial and non-financial contexts” (p. 22). Such statements under-score a problem popularized by Taleb (2007) and (2005 [2004]); namely, that as human beings we do not, and likely never will, possess the knowledge necessary to quantify social systems like we do for certain natural systems.^{82, 83} This is not to say that quantitative analysis has no place in systemic financial risk analysis; for example, certain research streams seem to hold significant promise.⁸⁴ However, to be effective, quantitative analysis should be used in conjunction with other forms of qualitative and behavioral analyses. Given the experiences of the last generation research integrating these analyses into systemic findings and guidance is clearly called for.⁸⁵ But what can be done to manage risk in the interim?

2. Risk Management

“Things change, m’boy, things change. We have to recognize them when they do.”

-- George Goodman a/k/a Adam Smith⁸⁶

“Alas, nasty surprises are not scarce in financial markets.”

-- Benoit Mandelbrot and Richard Hudson⁸⁷

There are many misconceptions of risk management in general, and hedging in particular. Because risk, like value, is subjective (Homer and Sylla, 2005 [1963], p. 416) there is no one way to manage it; however, there are sound principles that can and should be applied to risk management, similar to more mature disciplines like financial analysis and performance management. Such principles could be applied to the three basic ways that risk can be managed: by mitigating it, diversifying away from it or transferring it. Examples of risk transfer include the procurement of insurance as well as hedging.

While economical investment can practically inform each of the three above risk management activities, this section of the paper focuses on its application to hedging. Before a hedge can be considered, a balance sheet must be intensely scrutinized for significant exposure concentrations. To understand why, recall the quote cited above on exposure concentrations: “If you have got sixty, one hundred billion, or however many billions of something on your balance sheet, that is a *very* big number... I don’t think you should ignore a big number, no matter what it is” (Tett, 2010 [2009], p. 64; italics original). I do not think big numbers should be ignored either. To be effective, such analyses should be conducted on both a gross and net basis, not just net. As Rickards (2011) explained, “Fundamentally, the risk is in the gross position, not the net. When gross positions increase by 500 percent, the theoretical risk increases by 5,000 percent or more because of the exponential relationship between scale and catastrophic event size” (p. 210). In other words, during an extreme event a recovery could be less than 100 cents on the dollar thereby exacerbating a concentrated loss.

Once material exposure concentrations have been identified, analysis could be undertaken to identify potential threats that could trigger a concentrated loss. Significantly, many times such threats will be “ambiguous.” According to Roberto, et al. (2006) *ambiguous threats* are potential losses that seem highly uncertain due to an unexpected (and frequently non-linear) fact pattern that does not lead to obvious conclusions. Threats that could trigger a concentrated loss—ambiguous and non-ambiguous alike—should be carefully tracked and if, over time, a

particular threat appears to be developing then risk management alternatives should be considered.

The concept of threat development is important because, contrary to popular opinion, most threats do *not* just occur; they develop over time. One recent example is the 2007-2008 financial crisis, which developed over the span of a decade as illustrated in Figure 5. During the threat development horizon, a number of practical risk management options were available to exposed parties, including hedging with credit default swaps (CDS). As an example, Grant (2008) observed in real time, and well before the onset of the 2007-2008 financial crisis, that one hedge fund bought credit “protection on the weaker tranches of at-risk mortgage structures. At the cost of \$14.25 million a year, the fund ha[d] exposure to \$750 million face amount of mortgage debt” (p. 171).⁸⁸

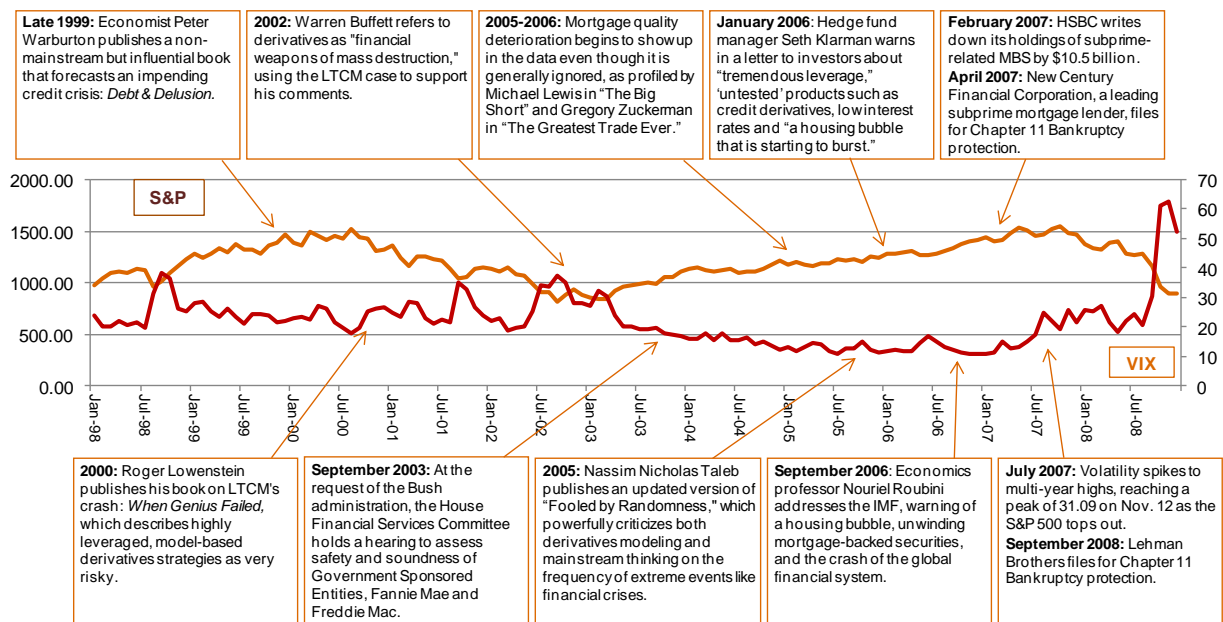


Figure 5
Development of the 2007-2008 Financial Crisis

Note: Thanks to Cathryn Marsh, Ph.D., for helping with this graphic.

To see how economical this investment was, consider the following: One way commercial insurance companies evaluate risk pricing is to divide the premium of risk transfer (in this case, \$14.25 million) by the amount of risk being transferred (in this case, \$750 million), which here gives a “rate on line” of \$0.014. By comparison, it is not uncommon for many businesses to pay \$40,000 or more per year for \$1 million of general liability insurance, which equates to a “rate on line” of \$0.04.⁸⁹

Lewis (2010) and Zuckerman (2009) profile a number of investors who put on similar investments but a few corporations did also, presumably by way of hedging. Consider, for

example, the hedge put on by Prem Watsa, Chairman and CEO of Fairfax Financial Holdings. In April of 2007, right before the onset of the crisis, Mr. Watsa accurately forecast an impending financial crisis stating, in part, that “There’s a possibility of a 1-in-50- or a 1-in-100-year storm coming.” According to Scott (2009):

“Near the end of July [2007] came one of the first signs of the storm Watsa had predicted: the Dow had its first mini-meltdown, losing about 400 points in one day. Watsa had already protected himself. He’d moved the bulk of his company’s \$16-billion (U.S.) portfolio out of the stock market and into relatively recession-proof treasury bonds and cash. Although he hadn’t participated in the market’s champagne swilling, he was determined to avoid the brutal hangover. In addition to moving his investments to higher ground, he used credit default swaps to wager that the U.S. credit market would go belly up. His bet: \$341 million. His take-home when the house of cards came tumbling down: more than \$2 billion.”

To illustrate how this hedge performed during the financial crisis, consider the chart presented in Figure 6. Fairfax's performance is presented in the left-most bar, which is significantly greater than the other five insurers that posted a profit during this time period, in contrast to all of the others that lost money. Despite the inherent logic of an economical hedging approach, and the well-publicized performance of firms like Fairfax that employ it, many firms not only do not take advantage of economical hedge pricing but they also start to hedge after prices have spiked due to widening spreads or expanding volatility.

From a risk *management* perspective, with emphasis on “management,” hedging should be conducted before—not after—spreads widen or volatility expands because that is when it is most economical to do so. While this may be difficult for firms that manage to the expectations of financial analysts, longer term investors will likely positively view missing a short-term earnings’ expectation by pennies (or even more) per share if the shortcoming results from economical risk management activities that are designed to not only mitigate the risk of becoming a forced seller during market distress, but will also position a firm to take advantage of the distressed selling of others. Such an approach should seemingly be at the forefront of corporate and professional investment risk management functions, especially strategic risk management functions, but that does not seem to be the case (e.g., Damodaran, 2008 and Crouhy, et al., 2006). Hopefully, this paper will help to redirect the focus, however marginally, toward such an approach from both a research and practical perspective.

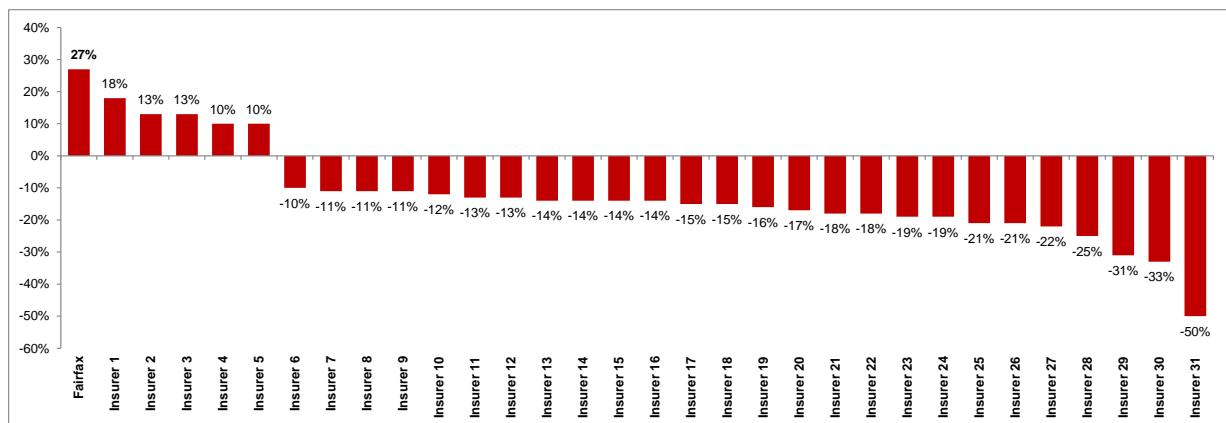


Figure 6
Relative Fairfax Performance in 2007

Data source: Dowling & Partners (2007), p. 8. The chart profiles 10% or greater changes in insurer performance, positive and negative, in the third quarter of 2007 with Fairfax at the far left. The names of the remaining insurers can be obtained from the source.

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Endnotes

¹ Basing the analytical framework on case histories is important for as the late Sidney Homer once observed, "Error and confusion on the real facts of past crises is common and leads to false expectations of future events" (Homer and Johannesen, 1969, p. 3). I have tried to avoid this error in drafting this paper.

² "My thesis is that financial complexity poses a clear and present danger" (Grant, 2008, p. 345).

³ Inspired by Perrow (1999 [1984]), p. 78.

⁴ As quoted in Kahneman (2011), p. 428. The authors continue, "Because of anchoring, people will tend to underestimate the probabilities of failure in complex systems."

⁵ Quoted by Tett (2010 [2009]), p. 64.

⁶ For details on the savings and loan crisis see, for example, Day (1993) and Mayer (1990).

⁷ According to Lowenstein (2010): "A disturbing side effect of the government effort to merge big banks was that banking power was becoming consolidated among fewer firms: big, protected institutions were swallowing everyone else" (p. 247).

⁸ A recent bank run occurred in 2007 at the United Kingdom's Northern Rock (Tett, 2010 [2009], p. 195). Other examples of modern day runs can be found in the failure of Bear Sterns (Rickards, 2011, p. 197) and WaMu, which at the time was the United States' largest savings and loan (Grind, 2012, p. 1).

⁹ For more information see Boyd (2011), and McLean and Nocera (2010), pp. 190-191. AIG's securities lending program also contributed to its historic failure (McLean and Nocera, 2010, p. 328 and Sorkin, 2009, p. 327).

¹⁰ McLean and Nocera (2010) note that "An LTCM bankruptcy could have been devastating for Wall Street, since the big firms were all on the hook for tens of billions of dollars of LTCM's losses, both as lenders and as counterparties" (p. 96). Interestingly, Sorkin (2009) observed that, "had they not saved Long-Term Capital, the next domino back in 1998 was clearly Lehman Brothers, which was suffering from a similar crisis of confidence" (p. 301). It is important to note that the cause of failures like these have historical precedent; for example, Rickards (2011) explains the cause of a 1931 panic in England as follows: "Leading English banks had made leveraged investments in illiquid assets funded with short-term liabilities, exactly the type of investing that destroyed Lehman in 2008" (p. 67).

¹¹ As Grant (2014b) insightfully observed, "Debts and derivatives bond nations together as religion or jazz have never done" (p. 1).

¹² See also Sorkin (2009), p. 208. For other examples see Grind (2012), p. 168, and Bagus and Howden (2011) who note the general lack of understanding of, or appreciation for, the interconnectivity of the global financial system during Iceland's failure (p. 40).

¹³ McLean and Nocera (2010) observed that in the mid-1980s derivatives dealers did not address their "fear that, in dispersing risk so widely, derivatives were transferring risk from a single institution to the entire financial system. All that hedging of derivatives... was creating an interconnectedness among

financial institutions that hadn't existed before. If one counterparty failed, what would happen to all the institutions holding its swaps contracts? What would happen if the risks weren't properly hedged? Who kept track of the exposures major financial institutions held in their derivatives books"? (p. 64).

¹⁴ As Homer (1978) insightfully observed, "in times of crisis liquidity needs can soar and indeed liquidity itself is partly psychological" (p. 53).

¹⁵ As Mahar (2003) observed, "Long-Term Capital Management thought it could calculate the market's risks and then balance them to create a risk-free system. But the real Black Swan was lying in wait. In this case, the black swan was not just that Russia defaulted on its debt—though this certainly was unexpected. The real wild card was this: How would the default affect a chain of intricately linked derivatives contracts that circled the globe? How would so many traders react to so much ambiguity? Would they freeze? Would they sell? How would LTCM's own responses affect the efficient market that it thought it had modeled?" (p. 284).

¹⁶ See Sorkin (2009, p. 269) for feedback effects related to Lehman Brothers and Acharya, et al. (2011, p. 98) on the feedback that drove mortgage finance volatility. By way of background, McLean and Nocera (2010) note that "it was government, not Wall Street, that first securitized mortgages" (p. 7).

¹⁷ It is important to understand that this is *not* a new phenomenon. For example, in his study of the New York money market, Goodhart (1969) observed that "the whole system of interconnecting links between financial centers, whereby capital movements were triggered in response to the emergence of sufficient interest differentials, appears at first sight to be a beautiful and smoothly working thermostatic device which would ensure that no monetary crisis should develop. Yet, the monetary system was not immune..." (pp. 107-108 and 17, 88 and 125). Note also Hammond (1957), pp. 558-559.

¹⁸ The title of the second chapter of this work is "Dancing Around the Regulators." Note also Boyd (2011), pp. 89, 112, Acharya, et al. (2011), p. 25, McLean and Nocera (2010), p. 189, and Sorkin (2009), pp. 394-395.

¹⁹ Note that Fannie Mae "helped pioneer the first deals that used the low-income housing tax credit program to create affordable housing" (McLean and Nocera, 2010, p. 11). "Tax arbitrage" in general has a long history (e.g., Wright, 2008, p. 29). Tax considerations have played a significant role in modern finance from the LBO movement of the 1980s (e.g., Lewis, 2011 [1991], pp. 69-70, 106) to the bailouts generated from the 2007-2008 financial crisis (e.g., Sorkin, 2009, p. 502 and Barth, 2009, p. 268). On the psychological effect that taxes can have on financial behavior see, for example, Kahneman (2011), p. 345.

²⁰ Note also Woods (2009), pp. 17-21, Sowell (2009), Ch. 2-3 and Barth (2009), pp. 24-25.

²¹ Bagus and Howden (2011) discuss the role of the implicit too-big-to-fail guarantee in Iceland's failure (pp. 38-41).

²² "The Fed's one-sentence statement read: 'The Federal Reserve, consistent with its responsibilities as the nation's Central Bank, affirmed today its readiness to serve as a source of liquidity to support the economic and financial system'" (Destler and Henning, 1989, p. 66, FN. 40).

²³ According to this same source, the “influential investment newsletter” was, *Facts & Trends*, Gary D. Halbert's Weekly E-Letter. (2007, August 28), p. 175. Some such as Rosenblum (2007) have disputed the existence of a Greenspan/Bernanke Put.

²⁴ Sheehan (2010) has called the Greenspan Put, “a government welfare program with consequences we continue to delay and magnify” (p. 106).

²⁵ For example, Lynch (2011) quotes the former Vice Chairman of the Federal Reserve System, Donald Kohn, as follows: “I placed too much confidence in the ability of the private market participants to police themselves.” Morgenson and Rosner (2011) make similar statements (p. 111), which appear to be based on the fact that derivatives products were not specifically regulated (e.g., McLean and Nocera, 2010, Ch. 7). If so, this position ignores the fact that the financial institutions exposed to these products, such as banks and insurance companies, were subject to significant regulatory scrutiny before, during and after the 2007-2008 financial crisis. As Redleaf and Vigilante (2010) observed: “The mortgage-backed securities market was created and driven by the largest, most well-established, most heavily regulated and government-subsidized players in mainstream financial markets” (p. 6). Barth (2009) concurs: “the current crisis cannot be chalked up to a lack of regulators. It is not even clear that the existing regulators need more powers. It is worth considering whether there are simply too many regulators with overlapping responsibilities...” (p. 184). Regarding the effects of government intervention on the housing market in general see, for example, Grind (2012), pp. 59, 64, 113, 135 and Sowell (2009), p. 18.

²⁶ For an alternative see Stockman (2013).

²⁷ “The early years of the republic are often spoken of as if the era were one of *laissez faire* in which government authority refrained from interference in business and benevolently left it a free field. Nothing of the sort was true of banking” (Hammond, 1957, p. 185). See also Barth (2009) on the “Origin of U.S. Banking Institutions and Expanding Regulatory Role of Government,” and related legislation from 1780-to-2008 (pp. 322-337). In short, prior to the establishment of the Federal Reserve System in 1913 the federal government regulated the banking industry and thus it was not “free.” Furthermore, there are some who feel that these regulations either caused or contributed to the famous 1907 financial crisis. For more information see Goodhart (1969), Ch. 4.

²⁸ As observed by Doyle (2014): “With the passage of time, the benefit of hindsight, and the preponderance of the evidence, American taxpayers can finally conclude that a regulatory cover of absolute immunity combined with little meaningful transparency added up to a license to steal—for Wall Street and Washington alike” (p. 87). For more information on questionable Washington behavior see, for example, Schweizer (2011). It is important to understand that this type of behavior is also *not* a new phenomenon; for example, there has been close interactions between government officials and banks ever since this country’s founding as, for example, Hammond (1957) has shown. This also occurred in the 1980s during Paul Volker’s chairmanship of the Fed, which may surprise some; if so, note that former Fed Chairman William McChesney Martin commented that Mr. Volker “was ‘very

good' in conducting monetary policy but 'a complete flop on bank supervision.'" (Quoted by Greider, 1987, p. 438).

²⁹ The cries for "more government" that typically follow a crisis often ignore this phenomenon thereby assuming that "government" is not prone to normal social behaviors. This position is also reflected in many economic studies and books, which tend to focus on select (i.e., isolated) data and actions thereby assuming away personal and social motives and relationships. There are exceptions, of course. Consider, for example, Rothbard (2005 [2002]), which includes social actors in its analysis, which is a theme employed by Prins (2014).

³⁰ Fiscal policy can affect a financial system in a number of ways; for example, wartime activity has historically resulted in significant levels of government spending and debt (e.g., Wright, 2008). See also Hunt (2009), pp. 59-65 and Kindleberger and Aliber (2011 [1978]), p. 49.

³¹ Consider the different tax treatments for dividends and capital gains, as well as the different tax treatments for health insurance provided by employers and health insurance purchased individually. On the influence of taxes to retirement benefits in general see, for example, Schultz (2011), pp. 16, 23, 25, 61, 96, 100-103, 113-114, 117-118, 122-125, 127, 131, 134-135, 139-140, 142, 197-202, 205-207, 209, and 213.

³² According to Woods (2009), "easy-money policy lures increasingly reckless or ill-prepared investors into the game, and misleads people into thinking a particular investment strategy is a no-lose proposition. Cheap money draws people into speculation who do not belong there, who know little about the market involved, and who see in it an irresistible get-rich-quick scheme" (p. 27). Theory suggesting that easy-money causes business cycles is contentious in some circles; however, it seems to be growing in acceptance. For example, Harris (2008) stated that "for the last two years of Greenspan's chairmanship, the funds rate was too low relative to trends in the economy" (p. 155). Note also Kindleberger and Aliber (2011 [1978]), p. 13 and Barth (2009), pp. 29-36, 244.

³³ See for example Acharya, et al. (2011), Morgenson and Rosner (2011), and Sowell (2009), pp. 48-56. On Iceland's GSEs see Bagus and Howden (2011), pp. 56-62.

³⁴ As Mahar (2003) observed, "Like society itself, the... market depended on a web of relationships, and that web stretched all the way to Washington" (p. 235).

³⁵ Note also Whitman and Diz (2009): "Adam Smith described the 'invisible hand' of the marketplace that will direct the allocation of resources to their most efficient use without government interference. This type of invisible hand does not exist in the United States. Instead, government will always have a huge role to play in how resources are allocated by the private sector" (p. xxi).

³⁶ Given all of the above, what is the reason for the constant drum-beat of blame against the "free market" after every market crisis? I do not know, but Duffy (2013) observed in a comment following a reproduction of the infamous February 15, 1999 *Time* magazine cover photo of Alan Greenspan, Robert Rubin and Larry Summers over the magazine's title, *The Committee to Save the World*, that "The iconic *Time* magazine puff piece revealed a mindset that would dominate the economy and markets ever since:

The financial elites would run things. Their primary tools would be monetary stimulus and systemic safety nets. If all went according to plan they would take credit; if not, they would blame capitalism. Either way, their power would expand. And if they failed to see around corners, they would claim no one could" (p. 16).

³⁷ The limits of economic and financial knowledge have long been known to certain economists such as Hayek (1945) and Sowell (1996 [1980]). Unfortunately, they are very much in the minority, especially today.

³⁸ See, for example, Salmon (2009). In addition to models, many have blamed rating agencies; however, as McLean and Nocera (2010) observed, credit rating agency involvement in mortgage backed securities was necessary for the market to mature because "investors were never going to be comfortable with—or, to be blunt, willing to work hard enough to understand—the intricacies of the hundreds or thousands of mortgages inside each security" (p. 8). Nevertheless, Barth (2009) correctly noted that, "It should have been obvious to every investor in subprime MBS that ratings are no substitute for careful research or due diligence before purchases" (p. 159). On this theme, Richard (2010) quotes investor Bill Ackman as follows: "And usually, by the way, most people don't read the stuff [i.e., financial disclosures] anyway,... So you've got a huge edge just by reading, right? And then if you really dig into something, you can really know more than the market" (p. 92).

³⁹ Incredibly, this philosophy is not limited to just modelers. For example, Roberto (2011) recalls fondly how he learned this approach as an undergraduate at Harvard University under Martin Feldstein and carried it over to his management research and teaching (Lecture 4). Interestingly, Feldstein was an AIG director at the time of its failure (e.g., Sorkin, 2009, p. 404).

⁴⁰ MacKenzie (2006) profiles this theory exceedingly well, which Redleaf and Vigilante (2010), Taleb (2007) and (2005 [2004]) powerfully critique.

⁴¹ This explains, at least in part, why financial academics seemed to have been caught so unaware in past crises from the performance of portfolio insurance in the 1987 stock market crash (Kyrillos and Tufano, 1995 and Tufano, 1996) to the collapse of LTCM (two partners of which were Nobel prize winning economists; Lowenstein, 2000) in 1998, to the 2007-2008 financial crisis (Lewis, 2010). Regarding LTCM's failure, "all the tools of modern finance—excessive leverage, probabilistic risk models, unseen counterparty exposure—had been shown to be flawed" (McLean and Nocera, 2010, p. 107).

⁴² See also Sorkin (2009), p. 76.

⁴³ Redleaf and Vigilante (2010) correctly observed that these executives "yielded control of their balance sheets to the moods of the market" (p. 168).

⁴⁴ Exceptions include Paul Tudor Jones who profited during the 1987 crash (Schwager, 1989, p. 117), and Taleb (2005 [2004]) who profited during the Asian Contagion (p. 242). Lewis (2010) and Zuckerman (2009) profile investors who profited during the 2007-2008 financial crisis such as Burry (2010). Redleaf and Vigilante (2010) also profited during that crisis.

⁴⁵ Commenting on the 2007-2008 financial crisis, Barth (2009) noted, "There were plenty of telling indicators along the way that these trends [e.g., Federal Reserve-generated low-interest rates, inflow of foreign funds, homes sales and construction surges, etc.] converged to produce a bubble that was reaching dangerous proportions" (pp. 66-67).

⁴⁶ Markopolos (2010) offers a compelling case study of this; however, I do not believe that was what he intended. This phenomenon has a long history, e.g., Graham (1949), p. 30.

⁴⁷ MacKenzie (2006) suggests this was the primary cause of LTCM's failure: "LTCM's success led to widespread imitation, and the imitation led to a 'superportfolio' of partially overlapping arbitrage positions. Sales by some holders of the superportfolio moved prices against others, leading to a cascade of self-reinforcing adverse price movements" (p. 225). In contrast, I would argue that this was a complexity-based contributing factor to LTCM's failure.

⁴⁸ Inspired by Vaughan (1997 [1996]).

⁴⁹ Inspired by Vaughan (2008) who earlier described this phenomenon as follows: "The first decision establishes a precedent that becomes a normative standard for future decisions in similar cases, paving the way for development of a pattern" (Vaughan, 1997 [1996], p. 112). Pettis (2001) comments on this phenomenon while describing his liquidity cycle model (e.g., pp. 42-43), which has similarities to my business cycle model (Calandro, 2009, Ch. 5). Thanks to value investor Mitch Julis for making this connection.

⁵⁰ The authors continue: "Born of a well-intentioned and economically efficient goal of creating liquidity in the secondary mortgage market, these institutions morphed into typical profit-taking firms with an important exception—the government served as the backstop for the majority of their risks" (p. 12). Note also Grind (2012), pp. 120-121. A similar phenomenon occurred in Iceland prior to its collapse (Bagus and Howden, 2011, pp. 56-62).

⁵¹ As Vaughan (1997 [1996]) correctly observed: "Risk is not a fixed attribute of some object, but constructed by individuals from past experience and present circumstances and conferred upon the object or situation. Individuals assess risk as they assess everything else—through the filtering lens of individual worldview" (p. 62).

⁵² Perrow's argument suggests that increased volume increases market complexity, which I would tend to agree with in certain circumstances. Nevertheless, increased volume generally means greater liquidity and thus equates to loose coupling.

⁵³ Significantly, Tett (2010 [2009]) noted a feedback effect between leverage and complexity as complexity can be used to increase leverage, and thus returns (p. 94).

⁵⁴ According to Lowenstein (2008), "Financial debacles are as old as the sun. Virtually all involve some form of borrowing" (p. 231). This includes the United States' first panic, the Panic of 1819. For more information see Rothbard (2007 [1962]).

⁵⁵ As quoted by Lewis (2011 [1991]), p. 101. Barth (2009) observed that, "It has always been clear that firms that grow too big, with too little capital, are disasters waiting to happen" (p. 166). And from a

systemic perspective, Pettis (2001) observed that, "financial crises are nearly always caused by poorly managed capital structures" (p. xvi).

⁵⁶ As Graham and Dodd (1934) observed in their classic and seminal work: "attempts to increase yield at the expense of safety are likely to prove unprofitable" (p. 83).

⁵⁷ See Rothbard (2000 [1963]) and Bruner and Carr (2007) to name just two sources.

⁵⁸ McLean and Nocera (2010) indicated that LTCM's leverage reached as high as 250-to-1 (p. 97). As MacKenzie (2006) explained, "Only with leverage does arbitrage of the kind conducted by LTCM become attractive" (p. 226).

⁵⁹ Sorkin (2009) puts the figure at \$2.7 trillion (p. 236).

⁶⁰ See Barth (2009) for a discussion of the relevant regulatory capital requirements (pp. 179-182).

⁶¹ As another example, "Icelandic firms employed debt-to-equity ratios 3.6 times higher than comparable firms in other Scandinavian countries" (Bagus and Howden, 2011, p. 71).

⁶² A controversy has arisen about Professors Reinhart and Rogoff, a summary of which can be found in, for example, Bloomberg Business Week (2013).

⁶³ Note also Acharya, et al. (2011), pp. 91-92.

⁶⁴ According to Pettis (2001), it is important "to consider the national liability structure, not just at the federal level, and not just in terms of external debt. State, municipal, corporate, consumer, and mortgage-related debt and payment indexation must also be considered" (pp. 151-152).

⁶⁵ For more information on derivatives see, for example, Dunbar (2011), Tett (2010 [2009]) and Partnoy (1997).

⁶⁶ "If a society contracted too many claims against the future, if it amassed debts that the future economic effort could not possibly pay off, sooner or later it would pay the consequences. Borrowers would fail to meet their obligations; lenders would lose their gamble (Greider, 1987, p. 64).

⁶⁷ The reinsurance equivalent of a contagion is a spiral. For a historical example see Raphael (1995) for an account of the 1988 Piper Alpha spiral (Ch. 9), and note the systemic similarities with the 2007-2008 financial crisis.

⁶⁸ Hayek (1991 [1988]) said much the same thing: "the propensity to instinctive mass action remains one of several beastly characteristics that man has retained" (p. 17). Frankly, I find such terminology odd.

⁶⁹ See also Redleaf and Vigilante (2010), Ch. 14.

⁷⁰ Iceland experienced a similar reaction according to Bagus and Howden (2011, pp. 84-85).

⁷¹ Sorkin (2009) quotes hedge fund manager Stanley Druckenmiller making similar statements during the 2007-2008 financial crisis (p. 433). Such reactions can therefore be, "treated as rational depositor responses to an asymmetric information deficit" (Wicker, 1996, p. xvi).

⁷² As the late Charles Kindleberger observed, "More and more speculators seek to get out of whatever was the object of speculation, to reduce their distended liabilities, and to switch into money; and more

and more it becomes clear that not everyone can do so at once. There is a rush, a panic, and a crash" (quoted by Pettis 2001, p. 126).

⁷³ I am obviously not the first to make this observation, e.g., Pettis (2001) makes a similar claim in his widely regarded work (e.g., pp. 131-132).

⁷⁴ The need for this is obvious to me, but when I debate people who disagree with it I point to, for example, Reg NMS and the rise of high-frequency trading (Lewis, 2014).

⁷⁵ In conducting this review, analysts would be well served to study the lessons learned from other regulatory initiatives, including and especially railroad regulation. For more information see, for example, Klein (1994), Ch. 9, which is titled "Competition and Regulation: The Railroad Model."

⁷⁶ "Before federal deposit insurance was instituted, in 1934, a bank's creditors—mainly its large corporate depositors—monitored the quality of the bank's assets. After all, the creditors were at risk should the bank suffer losses or go out of business" (Kaufman, 1986, p. 53).

⁷⁷ Bagus and Howden (2011) cite maturity mismatching (Ch. 2) and currency mismatching (Ch. 4) as key causes of Iceland's financial collapse. Pettis (2001) states that less developed countries should recognize "the need to resolve future debt crises (and this is controversial precisely because it means acknowledging the *likelihood* of future crises)" (p. 164; italics original). I propose that all countries, not just less developed ones, should operate like this and that, given the financial history of the last generation or two, there is absolutely no reason to view it as controversial.

⁷⁸ As Lewis (2011) explained: "When you borrow a lot of money to create a false prosperity, you import the future into the present. It isn't the actual future so much as some grotesque silicone version of it. Leverage buys you a glimpse of a prosperity you haven't really earned" (p. 39).

⁷⁹ Note also Kindleberger and Aliber (2011 [1978]), p. 38. According to Lewis (2011): "The financial crisis of 2008 was suspended only because investors believed that governments could borrow whatever they needed to rescue their banks. What happened when the governments themselves ceased to be credible?" (p. xiii).

⁸⁰ Note also Stockman (2013): "Indeed, in a double dose of irony, it was the abandonment of balanced budget orthodoxy by the GOP after 1980 that led to the nation's rapid fiscal demise thereafter" (p. 193).

⁸¹ Fiscal excess worked in tandem with the processes of socializing risk. For example, Grant (1992) observed that, "With the partial socialization of the banking business, a process materially and ironically advanced in the Reagan years, the element of speculation was not removed, but its costs were shifted" (p. 5).

⁸² General relativity and quantum mechanics are amazing natural science successes; however, such successes are relatively rare. For example, the ability to predict the frequency and severity of earthquake and wind events is at best extremely nascent (as is the ability to predict climate, especially over longer time frames). Much the same can be said for the current level of understanding in biology and chemistry.

⁸³ In commenting on the collapse of LTCM, Taleb (2005 [2004]) noted that economists Robert Merton and Myron Scholes referred *ex post* to the losses sustained as a "ten sigma" event. Therefore, they either

perfectly estimated the probabilities of “an event that happens once every several times the history of the universe” or they were completely wrong (p. 242). Stiglitz, et al. (2002) made a similar claim, *ex ante*, about the potential failure of Fannie Mae and Freddie Mac: “the probability of a shock as severe as embodied in the risk-based capital standard is substantially less than one in 500,000 – and may be smaller than one in three million” (p. 6). These authors qualified their statement, somewhat, in a footnote: “The simulations above suggest that the probability of a shock as severe as the one embodied in the risk-based capital standard is infinitesimal. Given the difficulties in estimating low-probability events, the figure cited in the text is intended merely to provide an upper bound for, rather than the best prediction of, the actual probability” (p. 6). Such statements contrast sharply with Hayek (1991 [1988]) who famously observed that, “The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design” (p. 76).

⁸⁴ See, for example, Harmon, et al. (2011) and Yan, et al. (2010).

⁸⁵ I agree with Roberto (2009) that “synthesis indeed represents one of the most important responsibilities of a leader” (p. 114).

⁸⁶ Goodman (1972), p. 105.

⁸⁷ Mandelbrot and Hudson (2006 [2004]), p. xvii.

⁸⁸ According to Marks (2011), “Contrarian investors who had cut their risk and otherwise prepared during the lead-up to the crisis lost less in the 2008 meltdown and were best positioned to take advantage of the vast bargains it created” (p. 130).

⁸⁹ For more information on this kind of analysis see Calandro (2009), Ch. 6.